XGC-0 User Manual

1 June 2006

Obtaining and Building the XGC Code

XGC can be run in serial mode on a workstation or in parallel mode on a cluster of workstations or a massively parallel processing (MPP) system. It is written in Fortran 90 and uses the standard MPI library for interprocessor communications. An independent set of particles is evolved on each processor, so the parallel code performance should scale roughly linearly with the number of processors. Periodically kinetic information is gathered across all processors to compute the macroscopic plasma quantities such as density and temperature.

The XGC code may be accessed from our Subversion code repository at Oak Ridge National Laboratory (ORNL). For information on downloading and installing the Subversion client software, see http://subversion.tigris.org. Once you have Subversion installed, you can check out XGC like this:

```
svn checkout https://scienceforge.ornl.gov/svn/cpes xgc_devel
```

This command will produce subdirectories called trunk, branches, and tags inside a working directory called `xgc_devel`. Within the trunk subdirectory will be an XGC directory containing the XGC code and supporting files and documentation. The contents of XGC are outlined below.

```
README          explanation of XGC code contents (this file)
Makefile.generic    generic Makefile for unknown platform
Makefile.<machine>  platform-specific Makefiles for NERSC/ORNL
*.f90, *.F90        XGC source code files
input.*         XGC sample parameter input files
*.eqd           EQDSK files for sample magnetic equilibria
*lim*.dat       sample limiter data input files
*sep*.dat       sample limiter data input files
html            directory containing simple code documentation
            generated using the f90doc tool
Notes           some brief notes on code modifications
```

The XGC code can be compiled using either a machine-specific Makefile (if one exists for the desired platform) or by adapting Makefile.generic. The generic Makefile contains comments indicating how to edit the file to suit your platform configuration. The command "make -f ¡makefile-name¿" will then build the xgc2 executable. In order to run XGC, an input file named simply "input" must be provided by renaming and adapting one of the existing input.* files. The input file consists of a set of Fortran 90 variable namelists. Comments are provided to indicate the purpose of the different variables. Please consult the html docs for further details.